

SECTION 2: HEALTHCARE-ASSOCIATED INFECTION SURVEILLANCE

2.1. What is Surveillance?

Surveillance is the systematic collection, management, analysis, interpretation and reporting of data for use in the planning, implementation and evaluation of health practice. Perhaps the most vital component is the capacity to feedback data to person/s who can undertake effective prevention and control activities.

In a hospital setting, information obtained from surveillance of healthcare-associated infections (HAI) can be extremely important in the context of continuous quality improvement (CQI) as use of objective data is used to improve patient outcomes.

2.2. Why do we do Surveillance?

Surveillance of diseases, conditions or events can provide reliable data on which to base decisions. Surveillance data allows assessment of the size of the problem, trends over time, and can assist with planning and evaluating interventions. A good surveillance program should help to:

- Determine baseline rates of adverse events (including HAI);
- Detect changes in the rates or distribution of these events;
- Facilitate investigation of significantly increased rates of infection;
- Determine the effectiveness of infection control measures;
- Monitor compliance with established hospital practices;
- Evaluate changes in practice; and
- Identify areas where research would be beneficial.

2.3. Selecting Surveillance Targets

In a hospital setting, infection control teams must tailor their surveillance activities to best match resources with priorities and institutional objectives. Elements to be considered when choosing events for surveillance include the specific objectives of the surveillance system, i.e. what exactly do you want to know?

- The frequency of the event;
- The cost or impact of the event;
- The potential for surveillance data to contribute to prevention activities;
- The health needs of the client or patient population; and
- The organisation's mission and strategic goals.

The most important characteristic of any surveillance system is that the data that are collected allow you to answer the question you were asking.

Traditionally, surveillance for healthcare associated infections was often "hospital-wide" surveillance, where data were collected on all identified infections in the facility. This method of surveillance has now largely been overtaken by more targeted surveillance methods that focus on at-risk groups.

2.4. Essential Elements of Surveillance

This section describes the basic elements of surveillance of healthcare-associated infections.

2.4.1. Collection of Data

The US NHSN definitions are the most comprehensive and widely used definitions for healthcare-associated infections. VICNISS data collection is based on these definitions. **The use and correct application of these definitions is vital if the results of surveillance are to be compared between facilities and internationally.**

To ensure good, reliable data, the information being collected must be well defined and understood by all those involved. Staff collecting data must understand and apply these definitions consistently to ensure that, where an event or person does not meet the definition, they should be excluded.

2.4.2. Post Discharge Surveillance

Post discharge surveillance is of increasing concern because of shorter lengths of stay in the acute care inpatient setting. It is estimated that between 12% and 84% of SSIs are detected after discharge. However there is no consensus on which post discharge surveillance methods are the most sensitive, specific and practical. Although there are no standardised methods for this kind of surveillance, development of such systems is becoming increasingly important as without post discharge surveillance a significant percentage of infections may be missed.

Post discharge surveillance is not currently included in VICNISS.

2.4.3. Management of Data

Data should be collected, organised and stored in systems that facilitate analysis and reporting. Computerisation can greatly assist with this process. Computerised data should be backed up regularly to reduce chances of losing data.

2.4.4. Analysis of Data

Surveillance systems need to incorporate appropriate analyses, often not relying on count data alone, but using methods that take into account the size of the population under study, as well as the time period of the surveillance.

Using **ratios, proportions** and **rates**, rather than raw numbers to describe events often allows for comparisons between different time periods or facilities. When calculating a rate or ratio for healthcare associated infections the denominator (lower portion of a fraction) should closely represent the population at risk of acquiring the infection of interest e.g. total number of patient days, total number of central line days; the numerator (upper portion of a fraction) represents each event (e.g., infection) that occurs during the defined period of interest.

Examples of analyses relevant to healthcare-associated infections:

A. Calculation of Infection Rates

The general formula for calculation of infection rates is $(a/b) \times c$ where

a = the number of infections (**the numerator**)

b = the number in the population at risk (**the denominator**)

c = is a constant and is a multiple of 10.

The resulting rate should be a number greater than or equal to zero. For a proportion, *c* is 100, and the result can also be given as a percentage. Usually, for reporting device rates, *c* is 1000. The result is reported as a number of infections per 1000 device days.

For example, if in a sample of 120 total knee replacements there are four infections, the rate would be $4/120 \times 100$ or 3.33 percent. An alternative way to report this rate would be $4/120 \times 1000$ or a rate of 33.33 infections per 1000 operations.

B. Risk Stratification

Within any population, individuals exhibit variation. These differences may affect an individual's risk of infection.

For example, people with diabetes or obesity may be at a higher risk of infection than people without these conditions. When comparing populations, we often make attempts to adjust for these factors to make the comparisons fairer or more valid.

For further information refer to [Interpretation of Surveillance Results, Risk Stratification](#) (section 3.2.3 below).

C. Comparison of Rates

Comparison of infection rates for different time periods, for different hospitals or, less commonly, between individuals, should only be attempted in the following circumstances:

- Where rates have been calculated on groups stratified according to risk; and
- Where surveillance methods and definitions were uniform and consistently applied; and
- Where the sample size was sufficiently large to calculate a valid estimate of the infection rate (the required sample size depends on what the rate is expected to be, and can be calculated).

2.4.5. Feedback and Reporting of Data

The VICNISS Coordinating Centre (VCC) will analyse the data and report back to facilities within agreed timeframes.

The results of the analysis must be communicated to the persons who need the information and have the power to authorise changes. There is little point in carrying out surveillance if the data are not used to report on rates and to make changes where these are necessary. Regular reporting and feedback is a vital component of a successful surveillance system.

As an example, with regards to VICNISS data, we strongly encourage that surgical site infection (SSI) rates should be fed back to surgeons and surgical teams, central line associated bloodstream infection (CLABSI) rates should be fed back to intensivists and intensive care unit (ICU) staff, surgical antibiotic prophylaxis data should be fed back to surgeons, anaesthetists and surgical teams. Of course, all this data should be provided to Infection Control Committees, Quality Committees, and certainly Executive Management. This feedback should not be just one occasion, but on a regular, routine basis.

Information should be tailored to meet different needs. Executive Management will not necessarily need to know the same information as the surgeons. Simple reports that provide the target audience with the most important information in a couple of minutes are the most effective. This can be in simple graphs or tables. Ask your audience for feedback on the way the data is presented to them, but it is important to remember too much information can be distracting.

Many of these principles are outlined in “Basics of Surgical-Site Infection Surveillance”, Marie-Claude Roy, MD, MS; Trish M Perl, MD, MSc, *Infect Control Hosp Epidemiol* 1997;18:659-668.

Although the VICNISS Coordinating Centre does not have the resources to provide each hospital with individual graphs, we also provide data in Excel format and may be able to provide some tips on how best to present and disseminate your data. Please also refer to our guide on [How to Create Histograms with 95% Confidence Intervals in MS Excel](#) on the VICNISS website.